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ABSTRACT

To investigate young children's understanding of metaphorical language, 90 chidren from preschool to third grade were read stories ending with metaphorical sentences of varying degrees of difficulty--sentences representing more or less predictable story outcomes and differing in the complexity and explicitness of their figures of speech. After listening to a story, children were asked to act out the meaning of the final, metaphorical sentence. Their enactments were then categorized as either (1) unrelated to the action implied in the metaphor, (2) literal, (3) correct, or (4) composite--an interpretation falling between the correct and the literal meanings. Findings suggested that metaphor comprehension was a developmental skill influenced by the predictability, literalness, and explicitness of the figures of speech used. (MM)

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Technical Report No. 290

SOURCES OF DIFFICULTY IN THE YOUNG CHILD'S UNDERSTANDING OF METAPHORICAL LANGUAGE

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Abstract

Three experiments examined children's understanding of metaphorical language. In these experiments, preschool, first grade, and third grade children heard short stories ending with a metaphorical sentence describing an action. They were then asked to act out the stories and the metaphorical sentences using toys in a specially constructed "toy world." Metaphor comprehension was assessed on the basis of the children's enactments. The experiments manipulated the predictability of the story endings given the already established context, and two aspects of the complexity of the metaphorical sentences themselves: the verb of the metaphorical sentence (literal versus nonliteral verb), and the explicitness of its comparative structure (simile versus metaphor). Results showed that both the predictability of the story endings and the complexity of the metaphorical sentences had a marked effect on the difficulty of the metaphor comprehension task. The data were interpreted as supporting the view that the success or failure in comprehending metaphorical language depends on the overall difficulty of the comprehension task, conceptualized in terms of the interactive effects of different difficulty sources, rather than simply on the fact that a linguistic input requires a metaphorical interpretation. The experiments also identified some of the conditions under which even preschool children show evidence of metaphor comprehension, and clarified aspects of the development of metaphoric competence.

Sources of Difficulty in the Yound Child's Understanding of Metaphorical Language

Existing research reveals conflicting findings about the ability of children to understand metaphorical language. While research directly investigating children's comprehension of metaphor tends to show that metaphor comprehension does not occur until late childhood or early adolescence (Asch & Nerlove, 1960; Billow, 1975; Cometa & Eson, 1978; Winner, Rosenstiel & Gardner, 1976), there is other evidence that even preschool children have some basic metaphoric competence. For example, Gardner (1974) found that given a pair of adjectives (hard/soft) and a pair of sounds, colors, or faces, 3 1/2-year-old children could sometimes match such adjectives with an appropriate sound, color or face. Gentner (1977) also showed that preschool children can perform analogical mappings from the domain of the human body to pictures of mountains or trees as consistently as adults.

Further support for the idea that young children have some basic metaphoric competence comes from observations that preschool children are very creative in their use of language, making sophisticated comparisons that involve the ability to see similarity between things that, at a superficial level, seem very dissimilar (Billow, 1981; Carlson & Anisfeld, 1969; Chukovsky, 1968; Gardner, Winner, Bechhofer & Wolf, 1978; Piaget, 1962; Winner, MacCarthy, & Gardner, 1980). Of course, the fact that children produce utterances that appear metaphorical from the adult point of view, does not establish that the children themselves are aware of the distinction between metaphorical and literal similarity. However, in a

recent study, Vosniadou and Ortony (1983) found that by four years of age children are able to distinguish comparisons based on metaphorical similarity from those based on literal similarity.

In our view, the incompatibility between claims that young children do not understand metaphorical language and reports that they produce metaphors or have some fundamental metaphoric competence is partly due to certain methodological problems with the empirical research upon which some of these claims are based. Developmental work on metaphor comprehension often suffers from one or more of three common problems. First, failure to understand metaphors is sometimes confounded with lack of background knowledge. For example, the failure to correctly interpret a metaphor like "The prison guard was a hard rock" (see Winner et al., 1976) might be the result of inadequate knowledge about prison guards and/or about the particular personality traits to which "hard" can be applied metaphorically (but see Winner, Wapner, Cicone & Gardner, 1979).

Second, metaphorical utterances are often presented to children in the absence of any reasonable linguistic or nonlinguistic context. However, in real life children are not usually exposed to metaphors out of context. Thus, to test metaphor comprehension in this way puts the child in an unrealistic situation. Lack of an appropriate context can often lead to comprehension difficulties or errors even in an adult's comprehension of literal language, let alone in the child's understanding of metaphorical language.

Finally, children's comprehension of metaphor is frequently measured in terms of the quality of a paraphrase or explanation. Although the ability to paraphrase and explain metaphors is worth investigating, paraphrase and

explanation may not be valid indices of metaphor comprehension. They require the ability to reflect on one's comprehension and therefore impose cognitive demands in addition to those required for comprehension alone (Brown, 1980; Flavell, 1981). Thus, while appropriate paraphrases and explanations certainly suggest successful comprehension, inadequate paraphrases and explanations cannot be taken as evidence of comprehension failure.

Corroborating this last point are the results of studies not requiring verbal explanations of metaphors. For example, Winner, Engel and Gardner (1980) found that children do better in multiple-choice tasks than in tasks in which they must state the grounds of the metaphor themselves. Reynolds and Ortony (1980), using a four alternative forced choice task and the context of a short story, found that 7-year-olds showed evidence of metaphor comprehension. And, in the context of proverb comprehension, Honeck, Sowry and Voegtle (1978) found that 7-year-old children could understand proverbs when they had to match a proverb to one of two pictures--a nonliteral correct interpretation of the proverb and a foil. Yet even tasks such as these have their limitations: they do not give the child the opportunity to respond spontaneously and they still impose additional cognitive demands.

We believe that the processes underlying the understanding of metaphorical uses of language are fundamentally the same as those involved in the comprehension of literal uses of language. Thus we see no reason, in principle, why metaphorical language should present children with an insurmountable comprehension problem. In both literal and metaphorical uses of language the meaning of a linguistic input is derived rather than given. The derivation of this meaning is achieved under the constraining influences of the already established context and of characteristics of the input

itself. In other words, comprehension involves the interaction between top-down and bottom-up processes (Rumelhart, 1977). Within this general framework, the difficulty of a comprehension task can be conceptualized in terms of the interaction of two interrelated but independent difficulty sources: (a) the predictability of the meaning for a linguistic input with respect to the already established context (a predominantly top-down component), and (b) the complexity of the linguistic input itself with respect to its derived meaning (a predominantly bottom-up component). Both of these factors contribute to the difficulty of the comprehension task, presumably because of the nature and complexity of the underlying processes involved. When the difficulty of the comprehension task (i.e, deriving a meaning for the linguistic input) reaches some point, which we call the difficulty limit, comprehension failures result.

This account appears to apply to both literal and metaphorical instances of language use. However, while predictability of meaning is independent of the literal/metaphorical distinction, the complexity of a linguistic input is not. Other things being equal, one might expect metaphorical uses of language to be more difficult to understand than literal uses because additional processing is necessary to determine the referents of the terms used metaphorically. However, this does not mean that all metaphorical inputs need be harder to understand than any literal input. Nor does it mean that the additional difficulty resulting from metaphorical inputs always and necessarily results in a total level of difficulty that is close to or exceeds the difficulty limit for young children. Therefore we are skeptical about general claims that metaphor comprehension develops much later than the comprehension of literal language (e.g., Cometa & Eson, 1978), and that it

follows a literal stage (e.g., Winner, et al. 1976). Rather, it appears to us that, to a large extent, the success or failure of comprehending metaphorical uses of language depends on the overall difficulty of the comprehension task, conceptualized in terms of the interactive effects of different sources of difficulty, rather than on metaphor per se.

The purpose of the present research was to investigate the young child's understanding of metaphorical language within the theoretical framework we have outlined. Both of the two potential sources of comprehension difficulty, i.e. the predictability of the meaning of the linguistic input with respect to the established context, and the complexity of the linguistic input itself, were investigated. All three experiments manipulated predictability by using metaphorical sentences representing more likely or less likely outcomes of the same story. In addition, Experiments 2 and 3 examined the effects of the complexity of the linguistic input. This was accomplished by changing the verb of the metaphorical sentences (literal vs. nonliteral verb) and by manipulating the explicitness of their comparative structure (simile vs. metaphor).

The present experiments used metaphorical sentences that compared items which were expected to be relatively familiar to young children. Also, the experimental paradigm adopted required children to act out the actions described in the stories, including the actions implied by the metaphors. Children did this by manipulating objects in a specially constructed "toy world." Metaphor comprehension was measured on the basis of "enactments." This "enactment" paradigm provides a measure of metaphor comprehension which does not depend on metalinguistic skill or linguistic ability, and which still leaves the child free to respond to the task in his own way. In

addition, acting out the entire story forces children to process the story's content, making it more likely that they will use this content to understand the metaphor. Research (e.g. Paris & Lindauer, 1976; Markman, 1977) has shown that children do not always engage in sufficient cognitive processing of verbal information in experimental settings. Having children act out the stories helps to avoid this problem.

Experiment 1

One variable with obvious potential for influencing the difficulty of the comprehension task is the degree to which the idea expressed by a linguistic input is predictable from some already established context. The main purpose of this experiment was to investigate how the predictability of the idea expressed by a metaphor (its implied meaning) meaning affects its comprehension. Metaphors were presented in the context of a story and differed with respect to the predictability of their implied meanings. It was hypothesized that if predictability influences the difficulty of the comprehension task, then better performance should result from metaphors representing more probable story endings than from those representing less probable endings.

Method

Subjects. Subjects were 90 children: 30 preschoolers ranging in age from 4.0 to 4.11 years (mean age 4.5), 30 first graders, ranging in age from 6.0 to 6.11 years (mean age 6.5), and 30 third graders, ranging in age from 8.1 to 8.11 years (mean age 8.7). The children attended a nursery school or an elementary school in a rural town in Illinois. In each group approximately half of the children were girls and half were boys.

Design and materials. The design was a 3 (Grade: P vs. 1 vs. 3) x 2 (Predictability Level: more probable vs. less probable) factorial design with between subject measures on both factors. In addition there were two control groups, a literal-ending group, and a no-ending group. There were eight subjects in each group with the exception of the literal control group which had six subjects.

The task consisted of listening to seven short stories (a practice story and six experimental ones) and acting them out with toys. For the experimental group all stories ended with a metaphorical concluding sentence which described a story outcome and which also had to be acted out with toys. Comprehension was assessed on the basis of the children's enactments of the metaphorical concluding sentences.

Two types of concluding sentences were constructed for each story. They differed with respect to the likelihood of the story outcomes they described, given the story content. Those describing actions which represented relatively likely outcomes of the stories will be referred to as more probable. Those describing actions which represented relatively less likely story outcomes given the story's content will be referred to as less probable. The degree to which the actions described by the concluding sentences represented more or less probable story outcomes was operationally defined in terms of the likelihood that children would enact the ending described by the concluding sentence given only the preceding context information. These likelihoods were originally determined in a pilot study, and in this experiment were confirmed on the basis of the enactments of the no-ending control group.

The no-ending control group was run concurrently with the experimental group at each age level. The children in this group heard the stories without a concluding sentence and were asked to act out their own endings. Of the endings provided, 55% were the same as the actions described by the more probable concluding sentences while only 27% matched the actions described by the less probable concluding sentences. The remaining 18% of the endings did not agree with either one of the existing concluding sentences.

The literal-ending control group was included to ensure that children were able to understand and act out the particular story endings when expressed in literal language and thus to exclude the possibility that failure to correctly enact the metaphors was caused by factors unrelated to the experimental manipulation. In the literal control group the concluding sentences were "translations" of the metaphors in the sense that they induced similar enactments to those induced by a correct interpretation of the metaphors. The literal concluding sentences had the same syntactic form as the metaphorical concluding sentences. All concluding sentences appear in Table 1.

Insert Table 1 about here.

The stories varied in length from 90 to 110 words and described situations familiar to, or easily imaginable by young children. The following is an example of one of the stories together with its various endings:

Billy invited some of his friends to his house, so his mother baked some cookies. She told Billy not to eat the cookies before his friends arrived and she sent him to his room to play. Then she put the cookies in the cupboard and went out to the back yard. After his mother left, Billy came

down. He opened the cupboard and found the cookies. He was ready to eat the first cookie when he heard his mother coming back in.

More Probable Concluding Sentences

Metaphorical: "Billy was a squirrel burying the nuts."
Literal: "Billy was a child hiding the cookies."

Less Probable Concluding Sentences

Metaphorical: "Billy was a squirrel heading for his tree."
Literal: "Billy was a child running to his room."

The children acted out the stories with toy figures which were set up on a 4' x 5' rectangular board. Seven miniature buildings were placed on the long sides of the board, and one center piece was placed in the center of the board, facing the child.

Insert Photographs 1, 2, 3 and 4 about here.

The seven side buildings were the same in all stories and represented a constant environment in which the children enacted the stories. They are shown in photograph 1. The buildings were made of wood, were roughly to scale, and on average were about 10 inches high. They were painted by an artist in a realistic way. As shown in the photographs, the side buildings represented (starting from the right) a hospital, a school, a toy store, a church, two houses, and a McDonald's restaurant. There were four different center pieces. One depicted a park with a playground (photograph 2), another, the interior of a house (photograph 3), a third piece represented a football field (photograph 4) (used as a practice item), and finally one represented a circus.

Procedure. Each child was tested individually by two experimenters. Testing took place in a quiet room in the school and lasted from 35 to 40 minutes. Children were randomly assigned to the experimental group or to one

of the control groups. Each child was first asked to identify the various buildings. In the few cases in which a building could not be identified, the building was named by the experimenter. The child was then instructed to listen carefully to the stories and to act them out with the available toys. Children in the experimental group were told to pay particular attention to the ending of each story "because the story's ending will not say exactly what happens." They were instructed to use the toys to act out what they thought the ending of the story meant. Children in the no-ending control group were asked to act out their own endings to the stories. For all groups, one story was used as a practice item and was always read first. No specific feedback was provided, and, in particular, the children were never told what a correct enactment of a concluding sentence was like. The order of presentation of the other stories was random for each child.

One of the experimenters read the stories, stopping at prearranged positions to give the child time to act out the described actions. If the child could not act out the concluding sentence, the instructions were repeated and the sentence was reread. If this did not help, the experimenter proceeded to the next story. When all the stories were read, the experimenter asked the children in the experimental condition to justify their enactments of the concluding metaphorical sentences of the last three stories. The children were asked to try to explain what the metaphors meant.

The second experimenter recorded all the enactments on a map that corresponded to the story, and noted all relevant verbalizations. All sessions were audio taped and two children in each group were video taped.

Scoring. Upon examining the children's responses it became apparent that one story with its corresponding metaphorical sentences was particularly

difficult for all children to enact. This was because, for both the more probable and less probable endings, the nature of the physical set up made the intended metaphorical interpretation either too unlikely or inappropriate. For example, one of the endings required a small figure to "bully" a much larger figure. Children were reluctant to act this out under any circumstances. The data from this story were discarded, reducing the number of stories analyzed from six to five. Responses on the first (practice) story were not scored.

The children's enactments in the metaphorical-ending groups were coded by two independent judges. The few cases (2%) of disagreement were easily resolved after brief discussion. The following four categories of enactments were employed:

(1) Unrelated enactments covered cases in which a child performed an action apparently unrelated to that implied by the metaphor. If, for example, given the sentence Billy was a squirrel burying the nuts, a child made Billy's mother spank Billy, the response would be coded as an unrelated enactment. Those instances in which a child failed to respond to the metaphors at all were also placed in this category.

(2) Literal enactments covered cases in which a child tried to enact the metaphors literally. If, for example, given the sentence Billy was a squirrel burying the nuts, a child pretended that Billy was a squirrel and that he was burying some pretend nuts outside his house or in the floor of the kitchen, the response would be coded as literal.

(3) Composite enactments, which fell between literal and correct enactments (to follow), were the cases in which a child acted out the implied meanings of the metaphors partly literally and partly correctly. Again, if, given the

sentence Billy was a squirrel burying the nuts, a child made Billy try to bury the cookies in the kitchen floor like a squirrel, it would be coded as a composite enactment. In this example a child would have correctly interpreted nuts to refer to the cookies, but would have tried to enact burying literally.

(4) Correct enactments were those in which an action clearly corresponded to the implied meaning of the metaphors. Thus, if given the sentence Billy was a squirrel burying the nuts, a child made Billy hide the cookies either back in the cupboard or somewhere else, the response was coded as correct.

The children's enactments in the literal-ending control group were also examined. Each response was marked as correct if it represented an accurate enactment of the actions described in the literal concluding sentence.

Results

Results from the literal control group revealed that the children had no problem understanding the stories or enacting the endings when these endings were stated literally. The mean proportion of correct enactments was 1.00 for all age levels with the more probable endings. With the less probable endings this proportion was 1.00 for the third grade children, and 0.93 for the preschool and first grade children. Thus, the predictability of the concluding sentence, given the preceding context, seemed not to have affected the enactments in any significant way. This was not the case for the metaphorical concluding sentences.

Table 2 shows the mean proportion of responses in each of the four enactment categories for the more probable and less probable metaphorical concluding sentences in the three age groups. As the last column shows, the

mean proportion of correct enactments was high for all age groups in the case of the more probable metaphors, but it decreased dramatically, especially for the younger children, in the case of the less probable metaphors. This decrease was accompanied by an increase in all other enactment categories with the exception of literal enactments which disappear in the third grade group.

Insert Table 2 about here.

It should be mentioned here that the data were quite consistent across children. For example, given the more probable concluding metaphors, only one of the 24 children in the three age groups scored less than four out of five correct. In the less probable condition, only one preschooler (out of eight) produced more than two correct enactments, only one first grader produced more than three, while only one third grader produced less than three.

A 3 (Grade) x 2 (Predictability Level) analysis of variance was performed on the proportion of correct enactments to the stories containing metaphors. The unrelated, literal, and composite enactments were not included in this or in any of the other analyses reported in this or subsequent experiments. Also, because all ANOVA's were performed on proportional data having a binomial rather than a normal distribution, an angular or inverse sine transformation was applied in all cases. The Grade by Predictability level analysis showed main effects for Grade, $F(2,42) = 6.49$, $p < .01$, and for Predictability Level, $F(1,42) = 62.27$, $p < .001$. Although an inspection of Table 2 would lead one to expect a significant interaction between grade and predictability (and analyses using the untransformed data confirmed this expectation), the grade by predictability

interaction was not significant with the transformed data ($F < 1$).

In order to determine whether the performance of the experimental group exceeded the performance of the no-ending control group, two additional analyses were performed. First, the enactments in the no-ending control group which agreed with the actions implied by the more probable metaphors were compared to the correct enactments of these metaphors in a 3 (Grade) x 2 (Group : Metaphor vs. Control) analysis of variance. The analysis showed a main effect for Group, $F(1,42) = 28.93$, $p < .001$. The upper graph of Figure 1 presents the mean proportion of correct responses in the two groups. It shows that the children could all easily enact the implied meaning of the metaphors representing the more probable story endings, and that they did so much more often than did children in the no-ending control group.

Insert Figure 1 about here.

Then, the enactments in the no-ending control group which agreed with the action implied by the less probable metaphors were compared to the correct enactments of these metaphors in another 3 (Grade) x 2 (Group) analysis of variance. This analysis showed a main effect for Group, $F(1,42) = 6.10$, $p < .01$, a main effect for Grade, $F(2,42) = 6.50$, $p < .01$, and a Grade x Group interaction, $F(2,42) = 3.14$, $p < .05$. The mean proportions of correct enactments in these two groups appear in the lower graph of Figure 1. As can be seen, there was no difference between the experimental and no-ending control group in the case of the preschool children. First and third grade children, however, did better in the experimental group than the no-ending control group.

Examination of the verbal protocols revealed, as expected, that the older children provided better and more complete explanations of the metaphors than did the younger children. It was not until third grade that children began to systematically provide explanations that related the two domains analogically (e.g., "It meant like a squirrel is frightened when somebody gets near them and I thought it meant him darting up the stairs and going to bed so that his mom wouldn't know that he was in the kitchen trying to get the cookies"). Of the children who gave literal responses (preschoolers and first graders), most explained them mainly in terms of "pretend" actions. That is, Billy was not a real squirrel but he pretended to be one, he acted like a squirrel by running fast on four legs, digging, and burying the cookies. There were few "magical" types of responses such as those discussed by Winner et al. (1976).

Discussion

The results of this experiment suggest that under certain circumstances even preschoolers show evidence of understanding metaphorical language. This in itself is a new finding. It seems that children can and do draw inferences from the information provided by the linguistic and situational context in which the metaphor occurs--inferences which help them understand the metaphor's implied meaning. The decrease in the performance of, especially, the younger children on the metaphors that represented less probable story endings also indicates that the context in which the metaphorical language occurs is an important variable in metaphor comprehension.

It might be argued that the younger children did not really understand the more probable metaphors that they enacted correctly, but that they simply

acted out the actions invited by the linguistic and situational context. This argument is not, however, supported by the data. The fact that the more probable metaphor group performed significantly better than the no-ending control group shows that the presence of the metaphorical sentences contributed to the number of correct enactments over and above the contribution of the context. Still, all the children, and particularly the younger ones, found it difficult to use the meaning conveyed by the metaphor to revise their original hypotheses based on contextual information alone. This is shown by their low performance with the less probable metaphors. It seems that difficulties arose for these children not from the presence of metaphorical language per se, nor from the unpredictability of the ending per se, but from the conjunction of the two. This conclusion follows (a) from the fact that the more probable endings expressed metaphorically constituted no serious problem for the children, (b) from the fact that correct enactments of these metaphors were more likely to be produced given the context and the metaphor than given the context alone, and (c) from the fact that there was no effect of unpredictability when literal concluding sentences were used.

These arguments do not, of course, exclude the possibility that factors other than the predictability of the ending might account for the low level of performance on the less probable metaphors as well as the high level of performance on the more probable metaphors. Indeed, there is reason to believe that such additional factors were at work. Consider first the low level of performance on the less probable metaphors. A closer examination of the metaphorical sentences revealed that most of the less probable metaphors had an additional feature that may have increased their difficulty relative

to the more probable metaphors. While four of the five more probable metaphors contained a verb which could be interpreted literally (e.g., Kenny and Andy were puppies following their master), three of the five less probable metaphors contained either a verb which required a metaphorical interpretation (e.g., Sally was a bird flying to her nest), or an abstract verb which could not easily be interpreted literally (e.g., Billy was a squirrel heading for his tree). For the sake of brevity, we shall refer to this difference between the verbs as a difference between literal and nonliteral verbs. Metaphorical sentences containing a nonliteral verb might have been more difficult to understand than ones with literal verbs because of the need to make the additional metaphorical substitution. This additional source of difficulty in the less probable metaphors may well have resulted in a lower level of performance than would otherwise have been the case.

Turning to the performance on the more probable metaphors, two things are noteworthy. First, the absolute level of performance was high, and second, there was no effect of age. However, it does not follow from the fact that children at all ages were producing the same correct enactments, that the processes they employed in doing so were the same. In fact, it appears that the correct enactments of the more probable metaphors could have been produced even if the children had not processed all of the concluding sentence. In particular children might have been employing some procedure such as the following: (a) ignore the predicate in the first part of the sentence (e.g., "were puppies"), (b) interpret the verb (i.e., "following") as applying literally to the actors involved (e.g., Kenny and Andy followed someone), and (c) use contextual information and the meaning of the last noun

phrase (i.e., "their master") to generate an action (e.g., Kenny and Andy followed mother).

Such a "short-circuiting" procedure would only require one metaphorical substitution, namely that of the object noun phrase. Its use would lead to correct enactments of metaphorical sentences with literal verbs, but would tend to result in composite, literal or incorrect enactments of the sentences with nonliteral verbs. Given that the less probable metaphors were the ones containing the majority of the nonliteral verbs, the observed increase in the number of composite, literal, and incorrect enactments with the less probable metaphors is certainly compatible with the hypothesis that particularly the younger children used some such simplifying procedure.

Convincing evidence for the additional difficulty of the less probable metaphors and for the use of some sort of simplifying procedure could not be culled from the data because verb type (literal or nonliteral) and predictability were confounded, and the design, thus, did not afford enough degrees of freedom to explore this hypothesis with any certainty. Experiment 2 was designed specifically to address these issues.

Experiment 2

This experiment investigated the effect of the linguistic complexity of the metaphorical input on comprehension by manipulating the verbs of the metaphorical sentences, and it examined the interaction of this variable with the predictability variable investigated in Experiment 1. Since the results of Experiment 1 showed that by third grade children could deal adequately with the most difficult of the metaphorical sentences, the present experiment

involved only preschool and first grade children.

Method

Subjects. Subjects were 16 preschool children, ranging in age from 4.1 to 5.3 years (mean age 4.8) and 16 first grade children, ranging in age from 6.5 to 7.7 years (mean age 7.2). All children attended a nursery school or an elementary school in a rural town in Illinois. Approximately half of the children were boys and half were girls.

Design and materials. The design was a 2 (Grade: P vs. 1) x 2 (Verb Type: literal vs. nonliteral) x 2 (Predictability Level: more probable vs. less probable) factorial design, with within subject measures on the last factor. The task again involved listening to seven short stories (one practice story and six experimental ones) and acting them out. Comprehension was assessed on the basis of the children's enactments of the metaphors. Of the seven stories, five were the same as those used in Experiment 1. The same toys were used in this experiment as in the previous one. The concluding sentences differed, first of all, with respect to verb type. Half of the sentences used a verb which could be appropriately interpreted literally (e.g., "Paul was a rabbit running to his hole") and half of the sentences used a verb for which, given the context of the story, a nonliteral interpretation would be more appropriate (e.g., "Paul was a rabbit hopping to his hole"). Second, as in Experiment 1, the sentences differed with respect to the likelihood of their implied outcomes. Three of these sentences (Sentences 3, 4, and 5) represented a more likely outcome given their contexts than did the other three (Sentences 1, 2, and 6).

Apart from the differences already mentioned, the main design difference between this experiment and Experiment 1 was that in the present experiment there were no control groups. A literal control group was considered unnecessary in view of the high level of performance with literal endings found in Experiment 1. Nor was there a no-ending control group in this experiment. Instead, each child was first asked to act out his/her own ending to the story and was only then read the metaphorical concluding sentence. Thus there were two tasks for each child: a completion task and a metaphor interpretation task. The completion task allowed a within subjects comparison of each child's enactment of his/her own ending with his/her enactment of the metaphorical concluding sentence. In this way we were able to know for each child what exactly was the story outcome that he/she expected and thus to what extent the child was able to revise his/her original hypotheses in light of the metaphor. The probability of enacting in the completion task a story outcome that matched the outcome implied by the metaphor was .35 for the metaphors representing the more probable outcomes, and .08 for the metaphors representing the less probable outcomes.

Procedure. Each child was tested by two experimenters. Testing took place in a quiet room in the child's school and lasted approximately 40 minutes. The experiment was introduced to the children as a game in which the experimenter would read stories and the children would have to act them out with the toys. The children were told that the game involved, first of all, guessing each story's ending and acting it out with the available toys. After each child had acted out an ending to a story, one of the experimenters read the metaphorical sentence and asked the child to act it out. The children were instructed to listen to the stories carefully and to pay

particular attention to the experimenter's endings because these endings would "not always say exactly what happened." The children were asked to think about the endings and act out what they thought they meant. If a child did not respond the first time, the metaphorical sentence was read again; but after that, the experimenter proceeded to the next story.

The six experimental stories were presented to each child in a random order, but always preceded by the practice item. After the last story was read, the experimenter went back to each story, reminded the child of the story's content and of the metaphorical sentence, and asked him/her to verbally explain and justify their enactments of these sentences.

As in Experiment 1, the children's enactments of the metaphors, as well as the enactments of their own endings, were noted on maps that depicted the experimental situation. Relevant comments were also noted down. Each session was audio taped and two children in each group were video taped.

Results

The children's enactments were again examined by two judges and were reliably classified as correct, composite, literal, or unrelated. Table 3 shows the mean proportion of enactments in each enactment category, for the more probable and less probable metaphors with literal and nonliteral verb.

Insert Table 3 about here.

A 2 (Grade) x 2 (Verb Type) x 2 (Predictability Level) analysis of variance with repeated measures on the last factor was performed on the transformed proportions of correct responses. The analysis showed main effects for Grade, $F(1,27) = 6.36$, $p < .05$, for Verb Type, $F(1,27) = 5.89$, $p < .05$, and for Predictability Level, $F(1,27) = 24.16$, $p < .001$. There was

also an interaction between Verb Type and Predictability Level, $F(1,27) = 4.78$, $p < .05$, the difference in the proportion of correct responses between literal and nonliteral verbs being greater for the more probable story endings than for the less probable ones.

Although errors were distributed across all three categories of erroneous enactments (i.e., unrelated, literal, and composite), overall, there were more composite and literal enactments with the nonliteral verbs than with literal verbs. In fact, the decrease in the proportion of correct enactments for nonliteral verb sentences (as compared to literal verb sentences) can be almost all accounted for by the increase in the proportion of literal and composite enactments (as opposed to unrelated enactments).

Since enactment type depends in part on the perceived meaning of the verb of the metaphorical sentence, this is not a surprising finding. It means that many of the children who recognized that the object noun phrase should be interpreted metaphorically, and understood what its implied meaning was, could not deal with the additional difficulty resulting from the presence of a nonliteral verb. Also, many children who could not understand the metaphoric meaning of the noun and who might have produced an unrelated response when presented with metaphors containing literal verbs, were influenced by the nonliteral verb and ended up giving literal rather than unrelated enactments.

In order to compare performance on the metaphor interpretation task with that on the completion task, a 2 (Grade) x 2 (Verb Type) x 2 (Predictability Level) x 2 (Task Type) analysis of variance with repeated measures on the last two factors was performed. For this analysis, enactments in the completion task which matched the actions implied by the metaphors in the

interpretation task were compared to the correct enactments of those metaphors. This ANOVA showed a main effect for Grade, $F(1,27) = 6.01$, $p < .05$, a main effect for Predictability Level, $F(1,27) = 54.05$, $p < .001$, and a main effect for Task Type, $F(1,27) = 20.13$, $p < .001$. The following interactions were also obtained: (a) Verb Type x Predictability Level, $F(1,27) = 6.63$, $p < .05$, (b) Verb Type x Task Type, $F(1,27) = 6.99$, $p < .05$, and (c) Grade x Task Type, $F(1,27) = 5.13$, $p < .05$. Interactions (a) and (b) were due to the fact that the difference between literal and nonliteral verbs was larger for the more probable outcomes than for the less probable outcomes, and for the metaphor interpretation than for the completion tasks. Interaction (c) was due to the fact that the proportion of correct enactments increased with age for the interpretation task but not for the completion task. Figure 2 shows the mean proportion of correct enactments in the interpretation and completion tasks for the more probable and less probable metaphors with literal and nonliteral verbs.

Insert Figure 2 about here.

It should be mentioned here that our criterion for metaphor comprehension was a rather conservative one. The need for the children to first act out their preferred story ending in the completion task and then to enact the meaning of the metaphor in the interpretation task might have made the correct enactment of the metaphors harder in this experiment than in Experiment 1. This is because children might have found it more difficult to revise their enactments (Experiment 2) than their hypotheses (Experiment 1).

Discussion

The results of this experiment show that understanding metaphorical sentences with nonliteral verbs was indeed more difficult than understanding metaphorical sentences with literal verbs. With respect to the influence of the predictability variable, the findings of Experiment 1 were replicated: children found it easier to enact the implied meaning of metaphorical sentences when they represented more probable endings than when they represented less probable endings.

The finding that literal verb sentences were easier to enact than nonliteral verb sentences is also compatible with the use of a short-circuiting procedure of the kind outlined in the discussion of Experiment 1. This hypothesized procedure consisted of ignoring the predicate in the first part of the sentence, interpreting the verb of the sentence literally, and using contextual information and the meaning of the noun phrase to generate the outcome of the action. If children had used such a procedure, they would tend to produce correct enactments for literal verb sentences, but composite, literal and incorrect enactments in the other cases. As Table 3 shows, the mere change from a nonliteral to a literal verb in the sentences representing the more probable story endings was enough to cause an increase in the proportion of correct responses, from 28% to 63% in the preschoolers, and from 54% to 84% in the first grade children. This increase replaced almost exclusively the composite and literal responses, the proportion of incorrect responses remaining virtually the same.

A similar increase in the proportion of correct enactments was found when the verb of the less probable metaphorical concluding sentences was changed from a nonliteral one to a literal one. However, because it was more difficult to identify the referent of the object noun phrase of the metaphors

in these cases, the use of the short-circuiting procedure would have been less productive thus giving rise to an increase in the proportion of incorrect enactments, as observed in the data.

Overall, performance was rather poor with the less probable metaphors, especially for the preschoolers. This suggests that the metaphors expressing contextually less predictable events, may have put the difficulty of the comprehension task beyond the difficulty limit for most of the children, even for the relatively less complex (literal verb) metaphors. However, if the difficulty of metaphor comprehension is determined by the cumulative effects of different sources of task difficulty (predictability and complexity), rather than by some special problem with the less probable endings, then some other manipulation that reduces the complexity of the metaphorical sentence might reduce the difficulty level of the comprehension task back below the limit. The most obvious candidate for reducing the complexity of the metaphorical sentence is the simile/metaphor manipulation. If the metaphors are presented as similes rather than as (predicative) metaphors the fact that they should be taken as comparisons rather than predications becomes direct rather than indirect, or explicit rather than implicit. Experiment 3 was conducted to investigate this possibility.

Experiment 3

It could be argued that the difference between metaphors and similes is primarily one of explicitness. A metaphor is stated in the form of a predicative statement but is intended to express a comparison. A simile, however, is an explicit metaphorical comparison. Thus, although they differ

with respect to their explicitness, similes and metaphors both involve nonliteral similarity (Ortony, 1979). For this reason we shall refer to similes as metaphorical sentences.

The knowledge that predicative statements can sometimes be intended nonliterally (as is the case with metaphors), is part of an adult's knowledge of how language is used. However, the ability to understand nonliteral similarity does not necessarily depend on any linguistic knowledge of that sort. It is thus possible that some of the difficulties young children have with metaphors might arise not from their inability to understand nonliteral similarity, but from their failure to interpret the predicative statement as an implicit comparison. If this is so, children should find similes easier to understand than metaphors, a hypothesis that has been confirmed with older children (e.g., Reynolds & Ortony, 1980).

Method

Subjects. Subjects were 16 preschool children, ranging in age from 4.0 to 5.3 years (mean age 4.8) and 16 first grade children, ranging in age from 6.8 to 7.8 years (mean age 7.0). The children attended the same elementary school and nursery school as the children in the previous experiment. Approximately half of them were girls and half were boys.

Design, materials, and procedure. The design for this study was a 2 (Grade) x 2 (Verb Type) x 2 (Predictability Level) factorial design, with repeated measures on the last factor. Again, each child participated in two tasks, a completion task and an interpretation task. The same stories and toys were used as in Experiment 2. The only difference between the two experiments was that all metaphors were replaced by their corresponding similes. For example, "Paul was a rabbit running to his hole," was replaced

with "Paul was like a rabbit running to his hole." Again the sentences differed with respect to verb type (i.e., "Paul was like a rabbit running to his hole" vs. "Paul was like a rabbit hopping to his hole"), and with respect to the likelihood of their implied outcomes. The same procedure was followed as in Experiment 2.

Results

The children's enactments were again grouped into four categories by two judges. Table 4 shows the mean proportion of enactments in each category type for the similes that represented more probable and less probable story endings with literal and nonliteral verbs.

Insert Table 4 about here.

Evidently, both the preschool and the first grade children found the similes easier to enact than the metaphors. The mean proportion of correct enactments of the similes in this experiment was much larger than it was for the metaphors in Experiment 2, for each of the categories of metaphorical expressions used. In addition, as in Experiment 2, the proportion of literal and composite enactments was greater with nonliteral verbs than with literal verbs.

A 2 (Grade) x 2 (Verb Type) x 2 (Predictability Level) analysis of variance with repeated measures on the last factor was performed on the transformed proportions of correct enactments. Main effects were obtained for Verb Type, $F(1,27) = 13.59$, $p < .001$, for Predictability Level, $F(1,27) = 14.94$, $p < .001$, and for Grade, $F(1,27) = 5.16$, $p < .05$. An interaction was also obtained between Grade, Verb Type and Predictability Level, $F(1,27) = 4.62$, $p < .05$. This was due to the fact that the first graders had a larger

number of correct enactments than the preschoolers when the similes (a) contained a nonliteral verb and represented less probable story endings and (b) when they contained a literal verb and represented a more probable ending, than in all other cases.

Again, in order to compare the children's performance on the two tasks, a 2 (Grade) x 2 (Verb Type) x 2 (Predictability Level) x 2 (Task Type) analysis of variance with repeated measures on the last two factors was performed on the enactments of both tasks that agreed with the implied meaning of the metaphorical sentences. The analysis of variance revealed main effects for Verb Type, $F(1,27) = 11.93$, $p < .01$, Predictability Level, $F(1,27) = 39.38$, $p < .001$, and Task Type, $F(1,27) = 41.97$, $p < .001$. There was also an interaction between Verb Type and Task Type, $F(1,27) = 8.34$, $p < .01$. Figure 3 shows the mean proportion of correct enactments for the two tasks in the various conditions.

Insert Figure 3 about here.

Discussion

As can be seen in Figure 3, if the completion task is considered to provide a baseline, the preschool children were generally able to enact the implied meaning of all the types of similes, except those that included both a nonliteral verb and represented a less probable story ending. Using the same criterion, first grade children showed evidence of some understanding in all conditions.

While the insertion of "like" clearly helped the children to enact the meaning of the metaphorical sentences, it did not always lead to correct paraphrases. Indeed, it appears that "like" was interpreted by the children

in one of two ways. One way was to interpret "like" as "looks like" or "acts like," focusing either on the perceptual similarity between the objects compared, or on the similarity of the actions in which the two agents engage (e.g., how does Billy look like a squirrel, how does Billy act like a squirrel). Most of the children who gave literal or composite enactments interpreted like to mean "acting like" in the literal sense (e.g., "Billy acted like a squirrel by getting down on his four legs and burying the nuts or the cookies," "Sally flew like a bird by running fast and moving her hands up and down," "Paul hopped and moved his ears like a rabbit," etc.)

The second interpretation of "like" involved focusing on the relational similarity "the way A did B was like the way C did D." For example, one child explained that "the way Sally ran to her mom was like the way a bird flies to its nest." Some of the children who gave correct enactments of the similes were also able to provide quite abstract relational interpretations of them, but this was rare. In most cases the first grade children could only justify their metaphorical substitutions of the objects of the metaphorical sentences. Thus, although the replacement of a metaphor by its equivalent simile leads to a new problem, namely that of how the word "like" will be interpreted, it nevertheless appears that it increases the probability of correct enactments.

General Discussion

Taken together, the results of the three experiments suggest that metaphor comprehension is a progressive development which starts quite early and during which children become better able to perform successively more difficult metaphor comprehension tasks. In this respect, our findings are

similar to those of many other studies which have shown that under certain circumstances evidence can be found for an early emergence of many cognitive skills (see Gelman, 1978).

It is interesting to consider the results of these experiments in terms of the difficulty limit discussed in the Introduction. To do this, suppose that each of the manipulated variables contributes an additional source of difficulty to the comprehension task when this variable is set at a more difficult level. In other words, less probable metaphors involve an additional source of difficulty relative to the more probable metaphors, metaphorical sentences with nonliteral verbs involve an additional source of difficulty relative to metaphorical sentences with literal verbs, and metaphors involve an additional source of difficulty relative to similes. We are assuming that each source of difficulty increases the overall difficulty of the metaphor comprehension task by at least one theoretically distinguishable step. Although increases in the number of these steps are assumed to be associated with increased and/or more complex processing requirements, these steps are only assumed here to be theoretically identifiable. There is certainly no reason to postulate that each step corresponds to a unique psychological process. The way in which such steps, identifiable in theory, correspond to psychological processes is a question for further research.

Insert Figure 4 about here.

Figure 4 summarizes the results from Experiments 2 and 3, conceptualized in this way. The mean proportion of correct enactments is shown separately for the metaphors representing the more probable and less probable endings. The metaphorical sentences have been assigned to one of three levels of

difficulty. The simplest level of difficulty, level 1, represents the similes with literal verbs. Difficulty level 2 represents the similes with nonliteral verbs, and the metaphors with literal verbs. In both of these conditions an additional source of difficulty is present relative to the metaphorical sentences at difficulty level 1. In the case of nonliteral verbs the additional source results from the need to determine the nonliteral verb's implied action, while in the case of the metaphor it results from the need to interpret the predicative statement as requiring an implicit comparison. Finally, difficulty level 3 represents the metaphors with nonliteral verbs. This condition introduces one more source of difficulty than in level 2: the implied meaning of the nonliteral verb must be determined, and the predicative statement must be recognized and interpreted as a comparative structure.

Figure 4 shows that both the predictability and the complexity variables are important contributors to metaphor comprehension difficulty. Looking at predictability first, it is apparent that the proportion of correct enactments decreases from more probable endings to less probable endings. This decrease in performance corresponds to the main effect for the predictability variable which is found in all three experiments. The proportion of correct enactments also drops as additional levels are added to the complexity variable. This trend occurs with both the more probable and the less probable endings, but is more evident in the case of the preschoolers than in the case of the first graders. Thus, the complexity of the linguistic input is also an important variable in metaphor comprehension. However, the performance of the children in the enactment tasks cannot be explained in terms of either the predictability variable or the complexity

variables alone. Rather, complexity interacts with predictability to produce a more complicated picture. As Figure 4 shows, preschool children generally failed to correctly enact less probable metaphorical outcomes for items beyond difficulty level 1, while they performed quite well with more probable metaphorical outcomes up to difficulty level 2. Similarly, the first grade children could barely manage two levels of difficulty when enacting less probable endings, but performed quite well at all levels of difficulty when enacting more probable endings. All children appeared able, in principle, to engage in the additional processing requirements of metaphorical sentences representing less probable endings, but they did so at the expense of the complexity variable.

What seems to matter, particularly for the younger children, is the total difficulty of the comprehension task in terms of various sources of difficulty, rather than some particular source, or combination of those sources. Not surprisingly, the degree of difficulty of the comprehension task that children can tolerate appears to increase with age. This would be expected if one assumes that as they become older, children are better able to process more information at the same time and/or that they are able to engage in qualitatively different processes.

Thus, in general, the findings are consistent with the view outlined in the introduction that the difficulty of a comprehension task depends both on the complexity of the linguistic input itself and on the predictability of its derived meaning. The present experiments suggest that children use the linguistic and situational context to draw inferences about what kind of linguistic input might come next. When these inferences are consistent with the meaning they derive for the linguistic input, comprehension is

facilitated. When they are not, comprehension is hindered. In the latter case, understanding the metaphorical expression involves revising hypotheses about the meaning of the linguistic input. This hypothesis revision requires additional processing and thus increases the difficulty of the comprehension task. The results suggest that even preschool children can revise their original hypotheses, but only when the complexity of the linguistic input is low. In a similar way, while increased complexity alone is not enough to cause comprehension failure, the combination of complexity with hypothesis revision is. Overall, there appears to be an interesting trade off between predictability and complexity, such that increasing the difficulty of one sets limits on how difficult the other can be before comprehension fails.

Although the present experiments indicate that even preschool children have some understanding of metaphorical uses of language, it must be pointed out that there was some evidence that this understanding might be less complete than that of an adult. In particular, the analysis of the kinds of errors made with nonliteral verbs in Experiment 2 suggests that some of the children may have been "short-circuiting" the metaphor by ignoring the predicate ("Billy was a squirrel burying the nuts"). Nevertheless, even if children were doing this, the resulting task still required some understanding of metaphorical language. Such short-circuiting may have simplified the sentences, but it did not eliminate all of their metaphorical elements.

Our findings have some interesting implications for a developmental theory of metaphor comprehension. Regardless of how rudimentary the preschoolers' understanding of metaphor is, the fact that there are some conditions under which they can understand metaphorical language is

inconsistent with efforts to relate metaphoric understanding to Piagetian theory, and especially to the claim that formal, or at least late concrete operational thinking is a necessary prerequisite for metaphor comprehension (Billow, 1975; Cometa & Eson, 1978; Elkind, 1970). It might be objected here that some of the preschool children were already performing at a concrete operational stage and that these were the children who enacted the metaphorical sentences correctly, the remaining ones failing. This argument cannot, however, account for the fact that the data were very homogeneous, with most of the preschoolers correctly enacting the metaphorical sentences when the difficulty of the comprehension task was low, but failing to do so as the difficulty of the comprehension task increased. The Piagetian position as commonly interpreted by investigators of metaphor is incapable of explaining both the high performance of most of the preschoolers in some of the tasks, and the observed decline in this performance as the complexity of the metaphoric input increases or its relation to the linguistic context becomes less predictable.

Although the present experiments contradict claims that concrete operations are a necessary prerequisite for metaphor comprehension, they do not necessarily invalidate the notion that the young child's classification abilities are related to metaphor comprehension. However, together with other research that has challenged many of Piaget's claims about the emergence and development of the young child's classification skills, (e.g., Rosch, Mervis, Gray, Jonhson & Boyes-Braem, 1976; Markman & Siebert, 1976; Mandler, 1982), they do show that the Piagetian position, at least as it is usually interpreted, provides a limited perspective from which to view the development of metaphoric understanding and the nature of the cognitive

mechanisms that underlie it (see also, Vosniadou & Ortony, 1983).

Our findings are also inconsistent with the position that the development of metaphoric understanding follows a clearly identifiable sequence of stages, which starts with literal responses first, and only later follows with more mature types of metaphoric understanding (e.g., Asch & Nerlove, 1960; Winner et al., 1976; Demorest, Silberstein, Gardner & Winner, Note 1). Very few children in our experiments adopted only literal interpretations of the metaphorical expressions, suggesting that they are not bound to one particular way of interpreting metaphorical language. On the contrary, as revealed in this study, children's metaphoric thinking seems to be more flexible than generally believed.

It might be argued that literal enactments of the metaphors were unlikely in these studies because materials necessary for such enactments (e.g., a toy squirrel and toy nuts) were not provided. While we agree that the provision of such materials would have increased the number of literal enactments, we believe that it would have decreased the ecological validity of the task. It is unusual for the literal referents of terms used metaphorically in ordinary communicative situations to be present in those situations. It would be confusing, if, speaking figuratively, one were to announce while in sight of a bridge, "We'll cross that bridge when we come to it." Our concern in this research was with the comprehension of metaphors, not with the comprehension of puns, or the recognition of humor!

The arguments against the notion of a literal stage as a necessary prerequisite to nonliteral interpretations of metaphors are not meant to belittle the fact that there is a tendency in young children, which decreases with age, to opt for a literal interpretation of the metaphor when its

correct meaning is elusive. In our experiments, these literal interpretations were justified on the grounds that they represented a pretend-play situation. Considering the amount of time a 4-year-old spends in pretend play, this interpretation of the metaphors must seem very natural to them, despite its inappropriateness as far as the general story context is concerned. Thus, while symbolic play has been thought of as a precursor to metaphor (Verbrugge, 1979; Winner et al., 1980)--which might very well be the case--we also see that the naturalness of pretend games might stand in the way of more mature metaphorical thinking in the young child.

One question that this study leaves unanswered centers around children's difficulty in correctly enacting metaphors involving nonliteral verbs. Is it simply that children find it hard to make the additional metaphoric substitutions, or are verbs more difficult to understand than nouns when used metaphorically? It has been argued that relational similarity is harder to understand than descriptive similarity (see Billow, 1975; Gentner, Note 2). However, even the simplest metaphorical expressions used in our experiments involved an implicit comparison of two objects (nest/house, repair shop/hospital, nuts/cookies) whose shared similarity was not of a physical/perceptual nature but of a relational nature. Thus, the success of the preschoolers in the present experiments, even with those metaphors and similes that involved only metaphorical nouns, shows a more sophisticated understanding of similarity and a higher level of metaphoric competence than that shown by other studies (e.g., Billow, 1975; Malgady, 1977; Vosniadou & Ortony, 1983), where the metaphors compared objects for which the primary basis of similarity was perceptual.

Finally, it must be acknowledged that in these experiments the manipulation of "predictability" was rather heavy-handed. For the purposes of the present experiments this manipulation was adequate, since its main purpose was to show that contextual predictability is an important variable in metaphor comprehension. A more careful examination of the contribution of context to the comprehension of metaphors would require a more thorough conceptual analysis of the notion of predictability.

Reference Notes

1. Demorest, A., Silberstein, L., Gardner, H, & Winner, E. Telling it as it isn't: Children's understanding of figurative language. Paper presented to the Society for Research in Child Development, Boston, 1981.

2. Gentner, D. Studies of Metaphor and Complex Analogies. Paper presented at the A.P.A. Symposium on Metaphor as Process, Montreal, September, 1980.

References

Asch, S., & Nerlove, H. The development of double function terms in children: An exploration study. In B. Kaplan & S. Wapner (Eds.), Perspectives in psychological theory. New York: International University Press, 1960.

Billow, R. M. A cognitive development study of metaphor comprehension. Developmental Psychology, 1975, 11, 415-423.

Billow, R. M. Observing spontaneous metaphor in children. Journal of Experimental Child Psychology, 1981, 31, 430-445.

Brown, A. L. Metacognitive development and reading. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, N.J.: Erlbaum, 1980.

Carlson, P., & Anisfeld, M. Some observations on the linguistic competence of a two-year-old child. Child Development, 1969, 40, 565-575.

Chukovsky, K. From two to five. Berkeley: University of California Press, 1968.

Cometa, M. S., & Eson, M. E. Logical operations and metaphor interpretation: A Piagetian Model. Child Development, 1978, 49, 649-659.

Elkind, D. Children and adolescents: Interpretive essays on Jean Piaget. New York: Oxford University Press, 1970.

Flavell, J. H. Cognitive Monitoring. In W. P. Dickson (Ed.), Children's oral communication skills. New York: Academic Press, 1981.

Gardner, H. Metaphors and modalities: How children project polar adjectives onto diverse domains. Child Development, 1974, 45, 84-91.

Gardner, H., Winner, E., Bechhofer, R., & Wolf, D. The development of figurative language. In K. Nelson (Ed.), Children's Language. New

York: Gardner Press, 1978.

Gelman, R. Cognitive Development. Annual Review of Psychology, 1978, 29, 297-332.

Gentner, D. Children's performance on a spatial analogies task. Child Development, 1977, 48, 1034-1039.

Honeck, R. P., Sowry, B. M., & Voegtle, K. Proverbial understanding in a pictorial context. Child Development, 1978, 49, 327-331.

Malgady, R. G. Children's interpretation and appreciation of similes. Child Development, 1977, 48, 1734-1738.

Mandler, J. M. Representation. In J. H. Flavell & E. M. Markman (Eds.) Cognitive Development Vol. 2 of P. Mussen (Ed.) Manual of Child Psychology, New York: Wiley, 1982.

Markman, E. M. Realizing that you don't understand: A preliminary investigation. Child Development, 1977, 48, 986-992.

Markman, E. M. & Siebert, J. Classes and collections: Internal organization and resulting holistic properties. Cognitive Psychology, 1976, 8, 561-77.

Ortony, A. Beyond literal similarity. Psychological Review, 1979, 86, 161-180.

Paris, S. G & Lindauer, B. K. The role of inference in children's comprehension and memory for sentences. Cognitive Psychology, 1976, 8, 217-227.

Piaget, J. Play, dreams and imitation in childhood. New York: Norton, 1962.

Reynolds, R. E., & Ortony, A. Some issues in the measurement of children's comprehension of metaphorical language. Child Development, 1980, 51, 1110-1119.

Rosch, E., Mervis, C., Gray, W. D., Johnson, D. M. & Boyes-Braem, P., Basic

objects in natural categories. Cognitive Psychology, 1976, 8, 382-439.

Rumelhart, D. E. Toward an interactive model of reading. In S. Dornic (Ed.), Attention and Performance, VI. Hillsdale, N. J.: Erlbaum, 1977.

Verbrugge, R. R. The primacy of metaphor in development. New Directions in Child Development, 1979.

Vosniadou, S., & Ortony, A. The emergence of the literal-metaphorical-anomalous distinction in young children. Child Development, 1983, 54, 154-161.

Winner, E., Engel, M., & Gardner, H. Misunderstanding metaphor: What's the problem? Journal of Experimental Child Psychology, 1980, 30, 22-32.

Winner, E., McCarthy, M., & Gardner, H. The ontogenesis of metaphor. In R. T. Honeck & R. R. Hoffman (Eds.) Cognition and Figurative Language. Hillsdale, N. J.: Erlbaum, 1980.

Winner, E., Rosenstiel, A. K., & Gardner, H. The development of metaphoric understanding. Developmental Psychology, 1976, 12, 289-297.

Winner, E., Wapner, W., Cicone, M., & Gardner, H. Measures of metaphor. New Directions in Child Development: Fact, Fiction and Fantasy in Childhood, 1979, 6, 67-75.

Table 1

Metaphorical Concluding Sentences

More probable

1. Billy was a squirrel burying the nuts.
2. Mary was a car being taken to the repair shop.
3. Kenny and Andy were puppies following their master.
4. Sally was a tiger walking towards the jungle.
5. Jack was a child being sent to his room.
6. Paul was a horse heading for his barn.

Less probable

1. Billy was a squirrel heading for his tree.
2. Mary was a pony being taken to the stable.
3. Kenny and Andy were puppies barking at their master.
4. Sally was a bird flying to her nest.
5. Jack was garbage being thrown in the trash.
6. Paul was a rabbit heading for the wolf.

Literal Concluding Sentences

More probable

1. Billy was a child hiding the cookies.
2. Mary was a girl being taken to the hospital.
3. Kenny and Andy were children following their mother.
4. Sally was a girl walking towards the school.
5. Jack was an elephant being sent to his cage.
6. Paul was a boy running home.

Less probable

1. Billy was a boy running to his room.
2. Mary was a girl being taken home.
3. Kenny and Andy were children yelling at their mother.
4. Sally was a girl going to her car.
5. Jack was an elephant being thrown out of the circus.
6. Paul was a child fighting the bad boy.

Table 2

Mean Proportion of Enactments in the four Enactment Categories of the Metaphorical Concluding Sentences

Grade	Enactment Categories			
	Unrelated	Literal	Composite	Correct
	More probable ending			
Preschool	.07	.03	.05	.85
1st	.0	.05	.05	.90
3rd	.0	.0	.07	.93
	Less probable ending			
Preschool	.45	.25	.07	.23
1st	.20	.17	.18	.45
3rd	.17	.0	.15	.68

Table 3

Mean Proportion of Enactments in the Four Enactment Categories for the More Probable and Less Probable Metaphors with Literal and Nonliteral Verb

Grade	Nonliteral Verb				Literal Verb			
	More probable Metaphors				More probable Metaphors			
	Unrelated	Literal	Composite	Correct	Unrelated	Literal	Composite	Correct
Preschool	.28	.23	.19	.28	.25	.12	.00	.63
1st	.04	.12	.30	.54	.04	.00	.12	.84
Grade	Less probable Metaphors				Less probable Metaphors			
	Unrelated	Literal	Composite	Correct	Unrelated	Literal	Composite	Correct
Preschool	.10	.52	.33	.05	.30	.46	.12	.12
1st	.17	.29	.29	.25	.17	.29	.21	.33

Table 4

Mean Proportion of Enactments in the Four Enactment Categories for Similes with Literal and Nonliteral Verb

Grade	Nonliteral Verb				Literal Verb			
	More probable Similes				More probable Similes			
	Unrelated	Literal	Composite	Correct	Unrelated	Literal	Composite	Correct
Preschool	.09	.05	.29	.57	.12	.12	.00	.76
1st	.17	.00	.25	.58	.00	.00	.00	1.00
Grade	Less probable Similes				Less probable Similes			
	Unrelated	Literal	Composite	Correct	Unrelated	Literal	Composite	Correct
Preschool	.14	.43	.38	.05	.21	.17	.00	.62
1st	.17	.08	.33	.42	.17	.17	.04	.62

Figure Captions

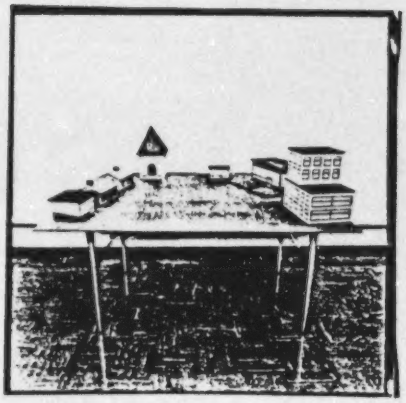
Figure 1. Photograph of materials.

Figure 2. Mean proportion of correct enactments for the Experimental and No-ending Control Groups.

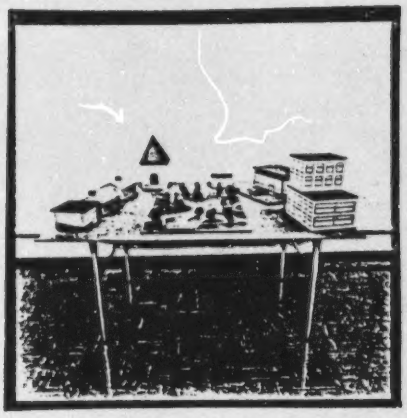
Figure 3. Mean proportion of correct enactments for the Interpretation and Completion tasks in Experiment 2.

Figure 4. Mean proportion of correct enactments for the Interpretation and Completion tasks in Experiment 3.

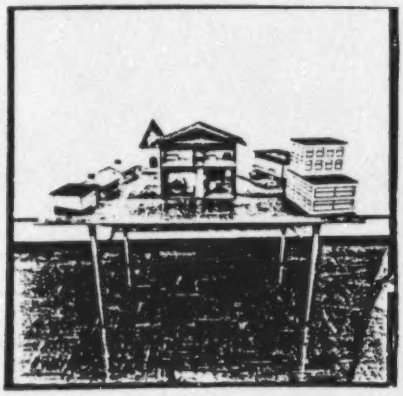
Figure 5. Mean proportion of correct enactments for the metaphorical sentences.



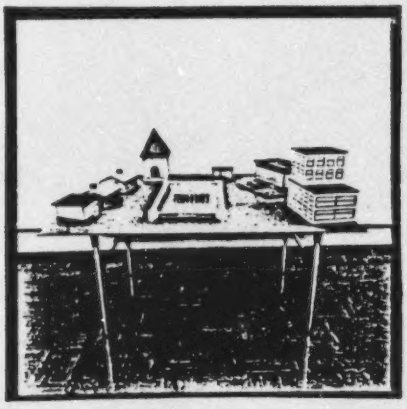
Photograph 1



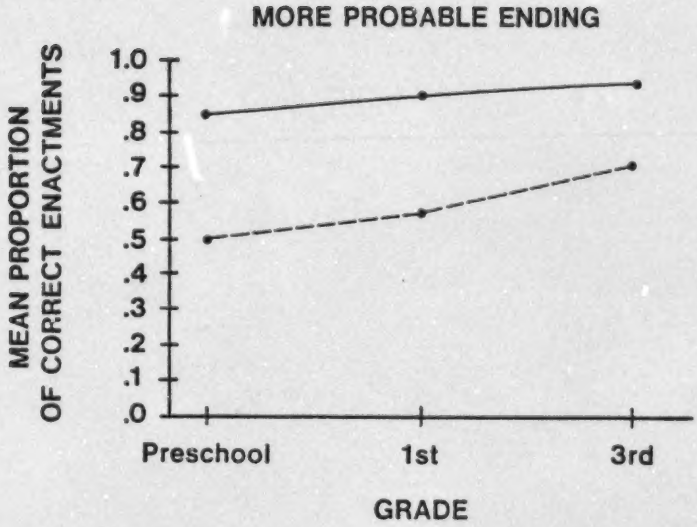
Photograph 2

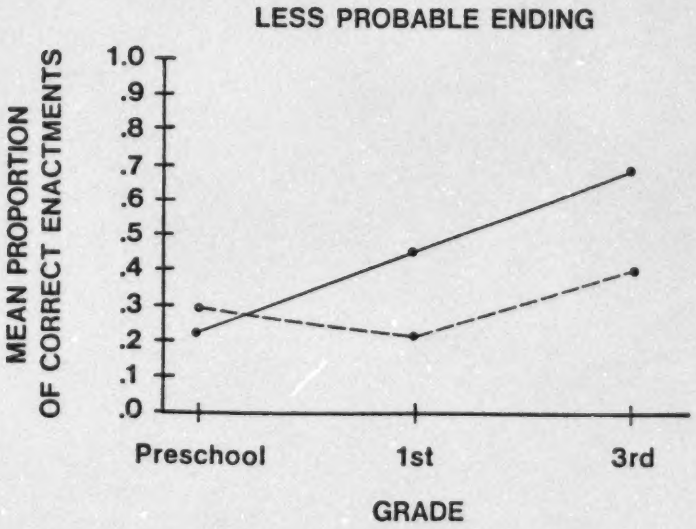


Photograph 3



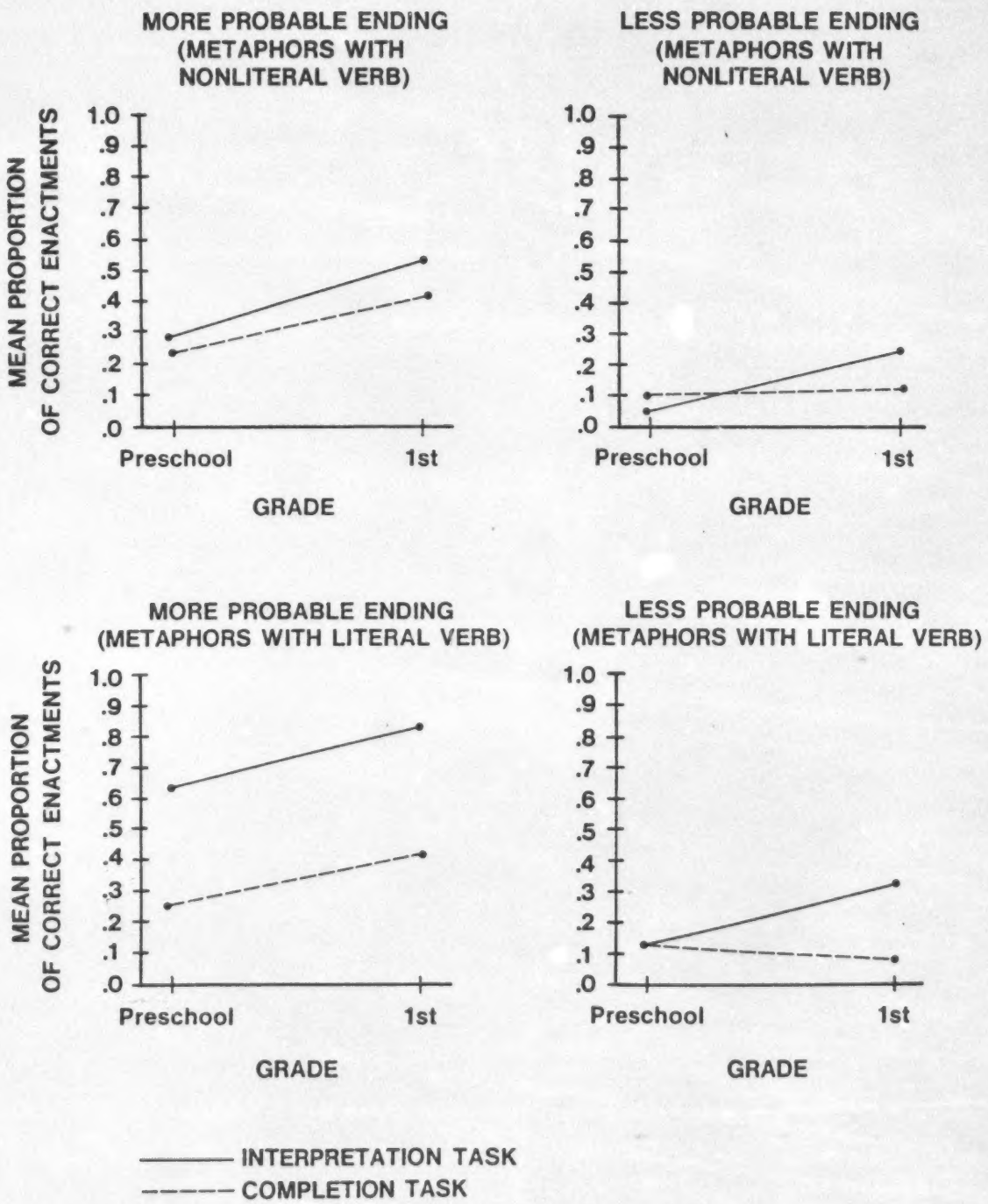
Photograph 4

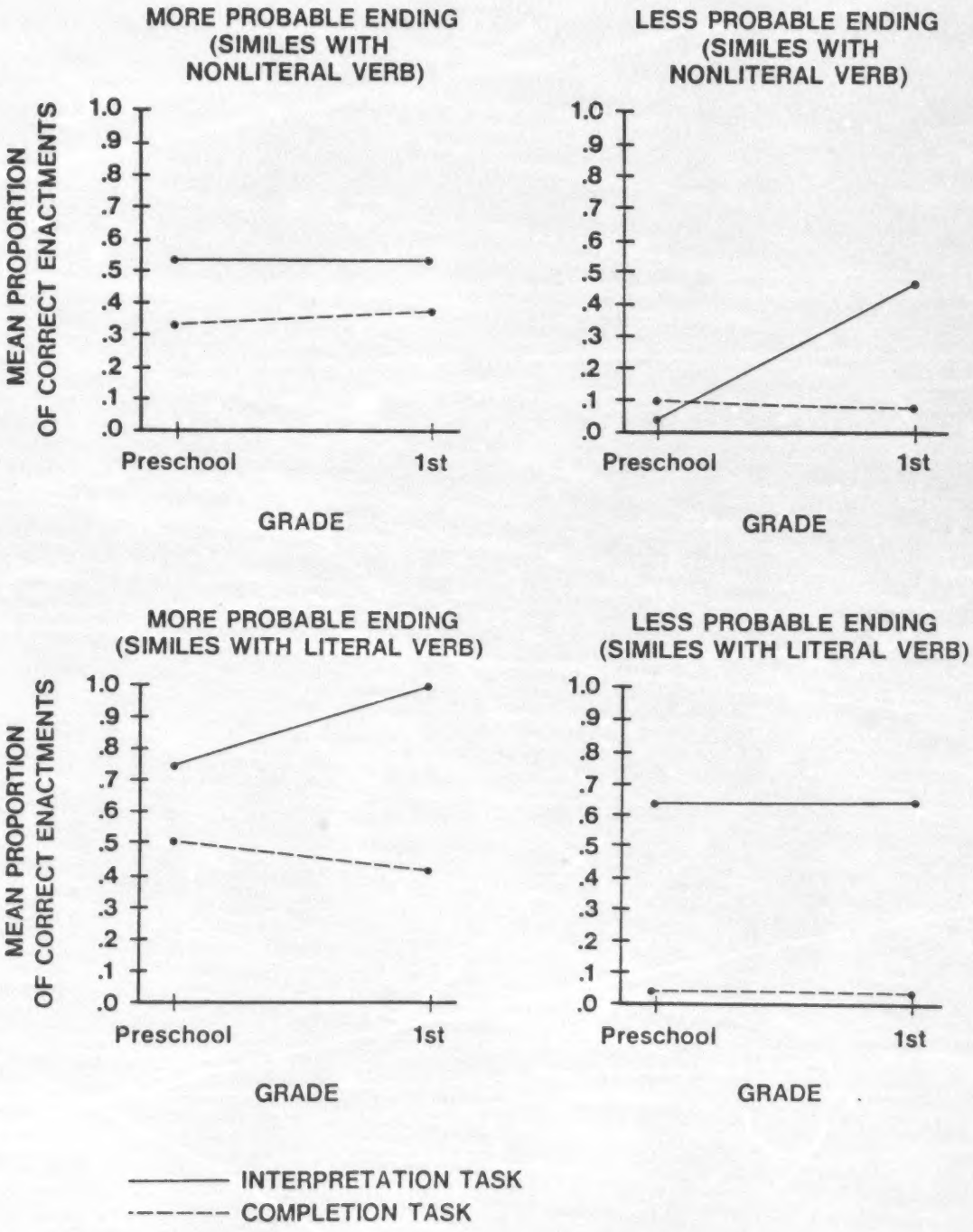




EXPERIMENTAL GROUP

NO ENDING CONTROL GROUP


MORE PROBABLE ENDING
(METAPHORS WITH
NONLITERAL VERB)
LESS PROBABLE ENDING
(METAPHORS WITH
NONLITERAL VERB)
MEAN PROPORTION
OF CORRECT ENACTMENTS
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
.0
Preschool
1st
GRADE
MORE PROBABLE ENDING
(METAPHORS WITH LITERAL VERB)
LESS PROBABLE ENDING
(METAPHORS WITH LITERAL VERB)
INTERPRETATION TASK
COMPLETION TASK


MORE PROBABLE ENDING
(SIMILES WITH
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LESS PROBABLE ENDING
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.5
.4
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.1
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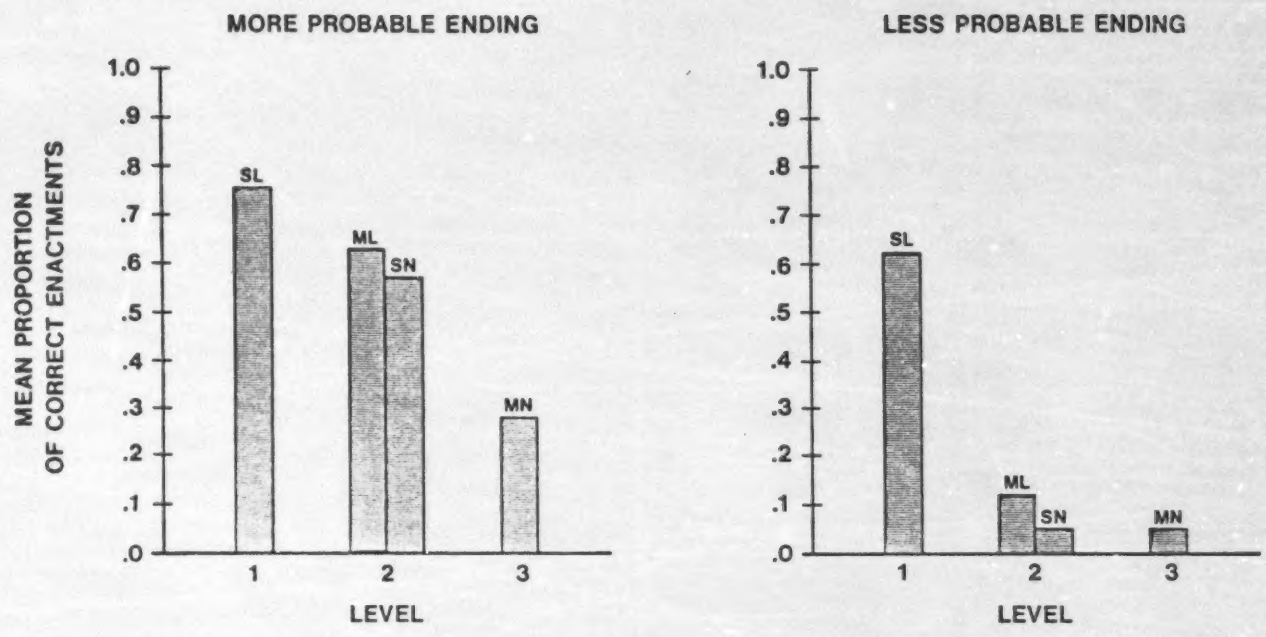
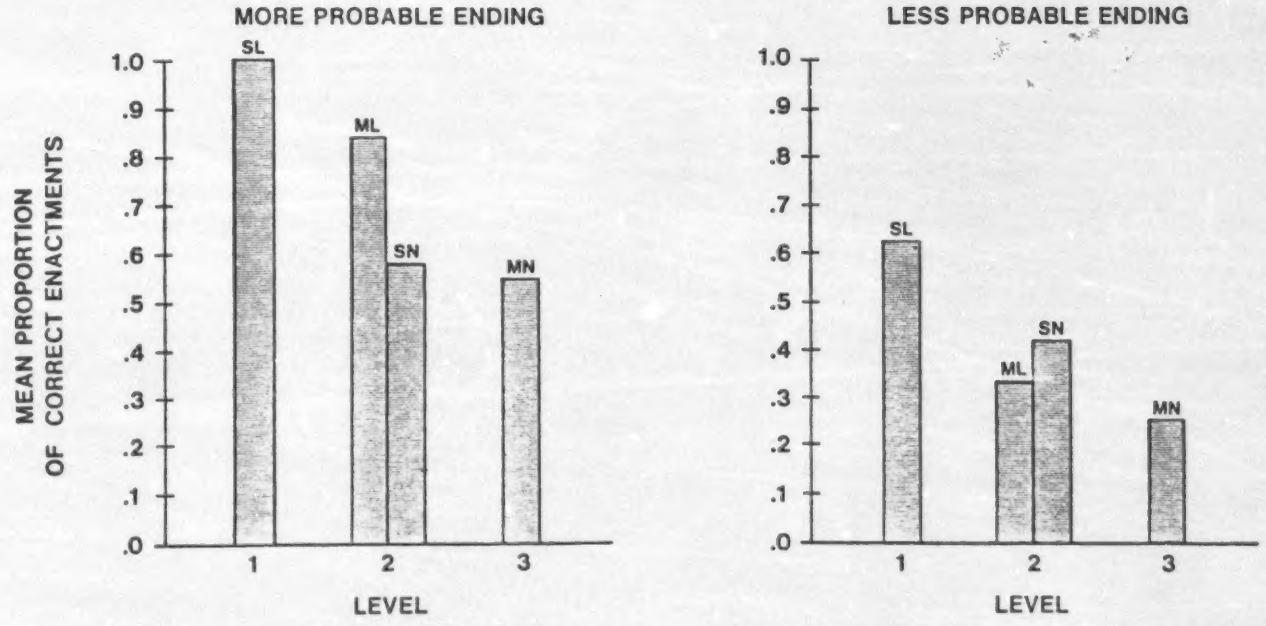
Preschool
1st
GRADE
MORE PROBABLE ENDING
(SIMILES WITH LITERAL VERB)
LESS PROBABLE ENDING
(SIMILES WITH LITERAL VERB)
INTERPRETATION TASK
COMPLETION TASK

PRESCHOOL



1ST GRADE



S: Simile
M: Metaphor
L: Literal Verb
N: Nonliteral Verb